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On a proposed Alteration of Bessel's Method for the Computation of the Corrections by which the Apparent Places of Stars are derived from the Mean Place. By the Astronomer Royal.

After mentioning the great superiority in uniformity and simplicity of Bessel's method over those previously in existence, the Astronomer Royal remarks, that the strict attention to *sign* required both in the partial additions and in collecting the sum, is exceedingly troublesome, and that more errors in observatory business arise from oversight as to *sign* than from any other cause. He has, therefore, been led to consider the possibility of avoiding changes of sign, and suggests the following method as probably an improvement in giving the data of the *corrections* in the Ephemeris and Catalogue.

On examining the *maximum* values of the quantities A, B, C, D, in the *Nautical Almanac*, and of a, b, c, d; a', b', c', d', in the B.A. Catalogue, it will be seen that A, B, and D, can never be equal to 25, that c' is always less than 25, and that up to a north polar distance of 3° 45′, c must also be less than 25. All the other numbers are less than 1·2.

Let $E = A + 25$ Let $e = a + 1{\cdot}2$ Let $e' = a' + 1{\cdot}2$
$F = B + 25$ $f = b + 1{\cdot}2$ $f' = b' + 1{\cdot}2$
$G = C + 1{\cdot}2$ $g = c + 25$ $g' = c' + 25$
$H = D + 25$ $h = d + 1{\cdot}2$ $h' = d' + 1{\cdot}2$

All the introduced symbols are necessarily positive.

Arranging and multiplying

$$Aa = Ee - 1{\cdot}2\,E - 25\,e + 30$$
$$Bb = Ff - 1{\cdot}2\,F - 25f + 30$$
$$\&c. \qquad \&c.$$

And

$$Aa' = Ee' - 1{\cdot}2\,E - 25\,e' + 30$$
$$\&c. \qquad \&c.$$

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Hence, collecting and arranging, it will be found that the sums of the corrections in R.A. and in North Polar Distance will be respectively,

$$\begin{aligned}\text{In R.A.} &= 120{\cdot}0 + E\,e + F\!f + G\,g + H\,h \\ &\quad - (1{\cdot}2\,E + 1{\cdot}2\,F + 25\,G + 1{\cdot}2\,H) \\ &\quad - (25\,e + 25f + 1{\cdot}2\,g + 25\,h)\end{aligned}$$

$$\begin{aligned}\text{In N.P.D.} &= 120{\cdot}0 + E\,e' + F\!f' + G\,g' + H\,h' \\ &\quad - (1{\cdot}2\,E + 1{\cdot}2\,F + 25\,G + 1{\cdot}2\,H) \\ &\quad - (25\,e' + 25f' + 1{\cdot}2\,g' + 25\,h')\end{aligned}$$

Where the numbers are seconds of time in the first group and seconds of space in the latter.

It will be seen that the second line in each group is identical, and depends solely on E, F, &c.; that is, on A, B, C, and D. This, therefore, could be tabulated in the *Ephemeris* for the day, under one symbol K. The third lines depend on a, b, &c, and a', b', &c.; and therefore admit of tabulation in the *Catalogue* as k and k' respectively for each star. The *corrections* could now be in this form:

$$\text{In R.A.} = 1\overset{s}{2}0{\cdot}0 + E\,e + F\!f + G\,g + H\,h - (K + k)$$

$$\text{In N.P.D.} = 12\overset{\prime\prime}{0}{\cdot}0 + E\,e' + F\!f' + G\,g' + H\,h' - (K + k')$$

The greatest possible value of K is about 182, and the greatest values of k and k' are about 170. Let

$$L = 190 - K,\ l = 170 - k,\ l' = 170 - k'$$

then substituting these values in the last equations, the corrections are,

$$\text{In R.A.} = E\,e + F\!f + G\,g + H\,h + L + l - 24\overset{s}{0}{\cdot}00$$

$$\text{In N.P.D.} = E\,e' + F\!f' + G\,g' + H\,h' + L + l' - 24\overset{\prime\prime}{0}{\cdot}0$$

in which every symbol is necessarily positive.

The Astronomer Royal finds that logarithms with five decimal places would be wanted for the corrections in R.A., and that four would be sufficient in N.P.D.

An additional column would thus be required for the Ephemeris and two columns for the Star Catalogue, but there would be no sign employed either in the tabulation or computation. The trouble of deducing E, F, &c., e, f, &c., L, l, &c., is trifling, and might be made still easier by subsidiary tables. The change proposed is not recommended for uncatalogued stars observed only once. Stars which are nearer the pole than 3° 45′ require special treatment.

Orbits of Double Stars. Computed by Capt. W. S. Jacob, B.E.

These orbits have been computed from all the observations accessible to the author, including his own for the current year. The orbit of *Castor* has only been roughly deduced, as the obser-

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